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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,597	WATANABE ET AL.	
	Examiner	Art Unit	
	Randolph Chu	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-87* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-32,35-42,44-47,49-68,71-78 and 81-87* is/are rejected.

7)☒ Claim(s) *6,11,33,34,43,48,69,70,79 and 80* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *7/1/2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/1/2004, 6/27/2006, 4/25/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 8 and 87 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "the post-processing" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 87 recites the limitation "the post-processing" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim (s) 1-5, 7-10, 13-15, 19, 21-27, 74-77, 38-42, 44-47, 49-52, 56, 58-63, 82-86 are rejected under 35 U.S.C. 102(e) as being anticipated by Kraft (US 2002/0141640).

With respect to claim 1, Kraft teaches contrast improvement unit operable to perform a contrast improvement process on an input image by comparing an object pixel of the input image with pixels that belong to surrounding areas (portions of the image) of the object pixel (para. [0017] and [0034]);

an image combination unit (correction of brightness) operable to combine an enhanced image obtained by the contrast improvement unit and the input image (para.

[0046] and [0049], correction mask (enhanced image) combined with image data (image input));

and an image output unit operable to output the image after combination (para. [0091]).

With respect to claim 2, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount for a pixel in the input image (para. [0049], correction mask);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion (correction of brightness) unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 3, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount by comparing the object pixel with pixels that belong to each of surrounding areas with different sizes (para. [0049] and [0168]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image

according to the extracted range (para. [0049]).

With respect to claim 4, Kraft teaches an average brightness calculation unit operable to calculate an average brightness of pixels in the input image (para. [0014]);

a conversion method selection unit operable to select a method of converting a contrast improvement amount to a value of pixel in the enhanced image based on the average brightness (para. [0014]);

and a pixel value estimation unit operable to convert the contrast improvement amount to a value of pixel in the enhanced image according to the selected conversion method (para. [0049]).

With respect to claim 5, Kraft teaches a standard intensity calculation unit operable to calculate a standard intensity value that indicates contrast intensity of the input image (para. [0014]);

a conversion curve estimation unit operable to estimate a conversion curve for converting the contrast improvement amount to a value in the enhanced image based on the standard intensity value (para. [0014]);

and a pixel value estimation unit operable to use the conversion curve to convert the contrast improvement amount to a value in the enhanced image (para. [0049]).

With respect to claim 7, Kraft teaches a signal conversion unit operable to convert a value of pixel in the input image to a plurality of signals that include a signal that is an object of contrast improvement (para. [0043]-[0045]);

an object correction data calculation unit operable to find a contrast improvement amount of the object pixel for an object signal obtained from the signal conversion unit (para. [0008]-[0010] and [0049]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount for the object signal (para. [0049]);

an object signal conversion unit operable to convert the contrast improvement amount for the object signal to a value of the object signal in the enhanced image (para. [0008]-[0010] and [0049]);

and a signal inverse conversion unit operable to find a value of pixel in the enhanced image based on the object signal of the enhanced image and signals other than the object signal obtained by the signal conversion unit (para. [0043]-[0049]).

With respect to claim 8, Kraft teaches a signal conversion unit operable to convert a value of pixel in the input image to a signal that is an object of contrast improvement (para. [0043]-[0045]);

an object correction data calculation unit operable to find a contrast improvement amount by comparing the object signal of the object pixel with the object signals of pixels that belong to each of surrounding areas with different sizes (para. [0008]-[0010], [0049] and [0168]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount for the object signal (para. [0049]);

an object signal conversion unit operable to convert a contrast improvement amount for the object signal to a value of the object signal in the enhanced image based on the extracted range (para. [0008]-[0010] and [0049]);

and a signal inverse conversion unit operable to find a value of pixel in the enhanced image based on the object signal of the enhanced image and signals other than the object signal obtained by the signal conversion unit (para. [0043]-[0049]).

With respect to claim 9, Kraft teaches an average object signal calculation unit operable to calculate an average value of the object signal in the input image (para. [0014]);

a conversion method selection unit operable to select a conversion method for converting the contrast improvement amount for the object signal to a value of the object signal in the enhanced image based on the average value (para. [0014]);

and an object signal estimation unit operable to convert the contrast improvement amount for the object signal to the value of the object signal in the enhanced image according to the selected conversion method (para. [0049]).

With respect to claim 10, Kraft teaches a standard intensity calculation unit operable to calculate a standard intensity value that indicates contrast intensity of the input image for the object signal obtained by the signal conversion unit (para. [0014]);

an object signal conversion curve estimation unit operable to estimate a conversion curve for converting the contrast improvement amount for the object signal to the value in the enhanced image based on the standard intensity value (para. [0014]);

and an object signal estimation unit operable to use the estimated conversion curve to convert the contrast improvement amount for the object signal to the value in the enhanced image (para. [0049]).

With respect to claim 13, Kraft teaches a contrast improvement unit operable to perform a contrast improvement process on an input image by comparing an object pixel of the input image with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]);

an edge data detection unit operable to detect edge data of the input image (para. [0049] and [0171]);

an image combination unit operable to combine an enhanced image obtained by the contrast improvement unit with the input image based on the edge data obtained by the edge data detection unit (para. [0046], [0049] and [0171], correction mask (enhanced image) combined with image data (image input));

and an image output unit operable to output an image after combination (para. [0091]).

With respect to claim 14, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount for a pixel in the input image (para. [0049], correction mask);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion unit operable to convert a contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 15, Kraft teaches a correction data calculation unit operable to find the contrast improvement amount by comparing the object pixel with pixels that belong to each of surrounding areas with different sizes (para. [0049] and [0168]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion unit operable to convert a contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 19, Kraft teaches an edge data detection unit operable to detect edge data of an input image (para. [00049] and [0171]);

a contrast improvement unit operable to perform a contrast improvement process on the input image by determining an area where an object pixel belongs based on the

edge data of the object pixel obtained by the edge data detection unit and brightness of the object pixel, and by comparing the object pixel with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]);

an image combination unit operable to combine an enhanced image obtained by the contrast improvement unit and the input image (para. [0046], [0049] and [0171], correction mask (enhanced image) combined with image data (image input));

and an image output unit operable to output an image after combination (para. [0091]).

With respect to claim 22, Kraft teaches an area judgment unit operable to determine an area where the object pixel belongs based on edge data (para. [0171] and [0049]);

a comparison range setting unit operable to select a pixel comparison range based on the area obtained by the area judgment unit ([0049]);

a correction data calculation unit operable to find a contrast improvement amount for the object pixel based on the pixel comparison range selected by the comparison range setting unit (para. [0014] and [0049]);

an adjustment coefficient calculation unit operable to calculate an adjustment coefficient for the contrast improvement amount based on the area obtained by the area judgment unit; an adjustment unit operable to correct the contrast improvement amount using the adjustment coefficient obtained by the adjustment coefficient calculation unit; an extraction unit operable to extract an effective range from distribution of the

corrected contrast improvement amount;and a pixel value conversion unit operable to convert the contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0048] and [0049]).

With respect to claim 23, Kraft teaches an area judgment unit operable to determine an area where the object pixel belongs based on the edge data (para. [0171] and [0049]);

a correction data calculation unit operable to find a contrast improvement amount by comparing the object pixel with a pixel that belongs to each of surrounding areas having different sizes (para. [0014],[0049] and [0168]);

an adjustment coefficient calculation unit operable to calculate an adjustment coefficient for the contrast improvement amount based on the area obtained by the area judgment unit; an adjustment unit operable to correct the contrast improvement amount using the adjustment coefficient obtained by the adjustment coefficient calculation unit; an extraction unit operable to extract an effective range from distribution of the corrected contrast improvement amount; and a pixel value conversion unit operable to convert the contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0048] and [0049]).

With respect to claim 21, Kraft teaches an edge data detection unit operable to detect edge data of an input image (para. [00049] and [0171]);

a contrast improvement unit operable to perform a contrast improvement process on the input image by determining an area where an object pixel belongs based on the edge data of the object pixel obtained by the edge data detection unit and brightness of the object pixel, and by comparing the object pixel with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]);

an image combination unit operable to combine an enhanced image obtained by the contrast improvement unit and the input image based on the edge data obtained by the edge detection unit (para. [0046], [0049] and [0171], correction mask (enhanced image) combined with image data (image input));

and an image output unit operable to output an image after combination (para. [0091]).

With respect to claim 74, Kraft teaches an area judgment unit operable to determine an area where the object pixel belongs based on edge data (para. [0171] and [0049]);

a comparison range setting unit operable to select a pixel comparison range based on the area obtained by the area judgment unit ([0049]);

a correction data calculation unit operable to find a contrast improvement amount for the object pixel based on the pixel comparison range selected by the comparison range setting unit (para. [0014] and [0049]);

an adjustment coefficient calculation unit operable to calculate an adjustment coefficient for the contrast improvement amount based on the area obtained by the area

judgment unit; an adjustment unit operable to correct the contrast improvement amount using the adjustment coefficient obtained by the adjustment coefficient calculation unit; an extraction unit operable to extract an effective range from distribution of the corrected contrast improvement amount;and a pixel value conversion unit operable to convert the contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0048] and [0049]).

With respect to claim 75, Kraft teaches an area judgment unit operable to determine an area where the object pixel belongs based on the edge data (para. [0171] and [0049]);

a correction data calculation unit operable to find a contrast improvement amount by comparing the object pixel with a pixel that belongs to each of surrounding areas having different sizes (para. [0014],[0049] and [0168]);

an adjustment coefficient calculation unit operable to calculate an adjustment coefficient for the contrast improvement amount based on the area obtained by the area judgment unit; an adjustment unit operable to correct the contrast improvement amount using the adjustment coefficient obtained by the adjustment coefficient calculation unit; an extraction unit operable to extract an effective range from distribution of the corrected contrast improvement amount; and a pixel value conversion unit operable to convert the contrast improvement amount of the object pixel to a value of corresponding pixel in the enhanced image according to the extracted range (para. [0048] and [0049]).

With respect to claim 24, Kraft teaches a contrast improvement unit operable to perform a contrast improvement process on the input image by determining an area where an object pixel belongs based on the edge data of the object pixel obtained by the edge data detection unit and brightness of the object pixel, and by comparing the object pixel with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]);

and an image output unit operable to output an image after combination (para. [0091]).

With respect to claim 26, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount for a pixel in the input image (para. [0049], correction mask);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion (correction of brightness) unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 27, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount by comparing the object pixel with pixels that belong to each of surrounding areas with different sizes (para. [0049] and [0168]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 25, Kraft teaches a contrast improvement unit operable to perform a contrast improvement process on the input image by determining an area where an object pixel belongs based on the edge data of the object pixel obtained by the edge data detection unit and brightness of the object pixel, and by comparing the object pixel with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]);

an image combination unit operable to combine an enhanced image obtained by the contrast improvement unit and the input image (para. [0046], [0049] and [0171], correction mask (enhanced image) combined with image data (image input));

and an image output unit operable to output an image after combination (para. [0091]).

With respect to claim 76, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount for a pixel in the input image (para. [0049], correction mask);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion (correction of brightness) unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 77, Kraft teaches a correction data calculation unit operable to find a contrast improvement amount by comparing the object pixel with pixels that belong to each of surrounding areas with different sizes (para. [0049] and [0168]);

an extraction unit operable to extract an effective range from distribution of the contrast improvement amount (para. [0049]);

and a pixel value conversion unit operable to convert a contrast improvement amount of the object pixel to a value of a corresponding pixel in the enhanced image according to the extracted range (para. [0049]).

With respect to claim 38, please refer to rejection for claim 1 above.

With respect to claim 39, please refer to rejection for claim 2 above.

With respect to claim 40, please refer to rejection for claim 3 above.

With respect to claim 41, please refer to rejection for claim 4 above.

With respect to claim 42, please refer to rejection for claim 5 above.

With respect to claim 44, please refer to rejection for claim 7 above.

With respect to claim 45, please refer to rejection for claim 8 above.

With respect to claim 46, please refer to rejection for claim 9 above.

With respect to claim 47, please refer to rejection for claim 10 above.

With respect to claim 84, please refer to rejection for claim 78 above.

With respect to claim 85, please refer to rejection for claim 79 above.

With respect to claim 86, please refer to rejection for claim 80 above.

With respect to claim 50, please refer to rejection for claim 13 above.

With respect to claim 51, please refer to rejection for claim 14 above.

With respect to claim 52, please refer to rejection for claim 15 above.

With respect to claim 56, please refer to rejection for claim 19 above.

With respect to claim 58, please refer to rejection for claim 20 above.

With respect to claim 59, please refer to rejection for claim 22 above.

With respect to claim 60, please refer to rejection for claim 24 above.

With respect to claim 62, please refer to rejection for claim 26 above.

With respect to claim 63, please refer to rejection for claim 27 above.

With respect to claim 61, please refer to rejection for claim 25 above.

With respect to claim 82, please refer to rejection for claim 76 above.

With respect to claim 83, please refer to rejection for claim 77 above.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 12, 16, 20, 49, 53 and 57 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of McNeil et al. (US 5,790,714).

With respect to claim 12, Kraft teaches all the limitations of claim 1 and a selection standard judgment unit operable to determine whether the input image or enhanced image has priority (para. [0214]); a combination coefficient calculation unit operable to set combination coefficients for the input image and enhanced image based on the judgment of the selection standard judgment unit (para. [0046], [0049] and [0214], correction mask (enhanced image) combined with image data (image input));

Kraft does not teach expressly that a weighted average combination unit operable to use the combination coefficients set for each image to generate a weighted average image of the input image and enhanced image.

McNeil et al. teaches a weighted average combination unit operable to use the combination coefficients set for each image to generate a weighted average image of the input image and enhanced image (col. 2 line 65 – col. 3 line 4).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do weighted average of input image and enhanced image in the apparatus of Kraft.

The suggestion/motivation for doing so would have been that the final image to contain a good representation of input image.

Therefore, it would have been obvious to combine McNeil et al. with Kraft to obtain the invention as specified in claim 12.

With respect to claim 16, Kraft teaches all the limitations of claim 13 and a combination coefficient calculation unit operable to calculate combination coefficients for the input image and enhanced image based on the edge data obtained from the input image (para. [0046], [0049] and [0214], correction mask (enhanced image) combined with image data (image input));

Kraft does not teach expressly that a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image based on the combination coefficients calculated for each image.

McNeil et al. teaches a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image based on the combination coefficients calculated for each image (col. 2 line 65 – col. 3 line 4).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do weighted average of input image and enhanced image in the apparatus of Kraft.

The suggestion/motivation for doing so would have been that the final image to contain a good representation of input image.

Therefore, it would have been obvious to combine McNeil et al. with Kraft to obtain the invention as specified in claim 16.

With respect to claim 20, Kraft teaches all the limitations of claim 19 as applied above from which claim 20 respectively depend.

Kraft does not teach expressly that a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image;and an output value setting unit operable to set a value of pixel in the output image based on the image obtained by the weighted average combination unit and the input image.

McNeil et al. teaches a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image;and an output value setting unit operable to set a value of pixel in the output image based on the image obtained by the weighted average combination unit and the input image (col. 2 line 65 – col. 3 line 4).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do weighted average of input image and enhanced image in the apparatus of Kraft.

The suggestion/motivation for doing so would have been that the final image to contain a good representation of input image.

Therefore, it would have been obvious to combine McNeil et al. with Kraft to obtain the invention as specified in claim 20.

With respect to claim 49, please refer to rejection for claim 12 above.

With respect to claim 53, please refer to rejection for claim 16 above.

With respect to claim 57, please refer to rejection for claim 20 above.

6. Claims 17 and 54 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Matama (US 6,603,886).

With respect to claim 17, Kraft teaches a contrast improvement unit operable to perform a contrast improvement process on an input image by comparing an object pixel in the input image with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]); and an image output unit operable to output the image after combination (para. [0091]).

Kraft does not teach expressly that a density correction unit operable to correct density distribution of an enhanced image obtained by the contrast improvement unit according to density distribution of the input image; an image combination unit operable to combine a corrected image obtained by the density correction unit and the input image;

Matama teaches a density correction unit operable to correct density distribution of an enhanced image obtained by the contrast improvement unit according to density distribution of the input image; an image combination unit operable to combine a corrected image obtained by the density correction unit and the input image (col. 9 line 63 – col. 10 line 16, Fig. 1).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to correct density and contrast and combine in the apparatus of Kraft.

The suggestion/motivation for doing so would have been that because maximum image density on photosensitive material is limited, details become imperceptible when there are large difference in luminance, to correct this problem density correction is necessary.

Therefore, it would have been obvious to combine Matama with Kraft to obtain the invention as specified in claim 17.

With respect to claim 54, please refer to rejection for claim 17 above.

7. Claims 18 and 55 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Matama (US 6,603,886) and in further view of McNeil et al. (US 5,790,714).

With respect to claim 18, Kraft and Matama teach all the limitations of claim 17 as applied above from which claim 18 respectively depend.

Kraft and Matama does not teach expressly that a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image;and an output value setting unit operable to set a value of pixel in an output image based on the image obtained by the weighted average combination unit and the input image.

McNeil et al. teaches a weighted average combination unit operable to generate a weighted average image for the input image and enhanced image; and an output

value setting unit operable to set a value of pixel in an output image based on the image obtained by the weighted average combination unit and the input image. (col. 2 line 65 – col. 3 line 4).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do weighted average of input image and enhanced image in the apparatus of Kraft and Matama.

The suggestion/motivation for doing so would have been that the final image to contain a good representation of input image.

Therefore, it would have been obvious to combine McNeil et al. with Kraft to obtain the invention as specified in claim 18.

With respect to claim 55, please refer to rejection for claim 18 above.

8. Claims 78 and 84 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Matama (US 6,603,886) and in further view of Grenier et al. (US 5,079,698).

With respect to claim 78, Kraft and Matama teach all the limitations of claim 17 and a correction data calculation unit operable to find a contrast improvement amount of the object pixel (para. [0014]); a conversion standard value calculation unit operable to find a conversion standard value for converting the contrast improvement amount to a value of pixel in the enhanced image (para. [0014]); and a pixel value conversion unit

operable to convert the contrast improvement amount to a value of pixel in the enhanced image based on the conversion standard value (para. [0049]).

Kraft and Matama does not teach expressly that a comparison pixel setting unit operable to set comparison pixels from among pixels in the area surrounding the object pixel to be used in the comparison.

Grenier et al. teaches a comparison pixel setting unit operable to set comparison pixels from among pixels in the area surrounding the object pixel to be used in the comparison (col. 11 lines 16 - 30).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to compare pixels in in the area surrounding the object pixel in the apparatus of Kraft and Matama.

The suggestion/motivation for doing so would have been that to find subtle changes in contrast and remove the effect of variations in the light field from the selected area.

Therefore, it would have been obvious to combine Grenier et al. with Kraft and Matama to obtain the invention as specified in claim 78.

With respect to claim 84, please refer to rejection for claim 78 above.

9. Claims 28 and 64 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841).

With respect to claim 28, Kraft teaches a contrast improvement unit operable to perform a contrast improvement process on the pre-processed image by comparing an object pixel of the pre-processed image with pixels that belong to surrounding areas of the object pixel (para. [0017] and [0034]); an image combination unit operable to combine an enhanced image obtained by the contrast improvement unit and the input image (para. [0046] and [0049],correction mask (enhanced image) combined with image data (image input));

Kraft does not teach expressly that a pre-processing unit operable to perform pre-processing on an input image and a post-processing unit operable to perform post-processing on an image after combination.

Hardin teaches a pre-processing unit operable to perform pre-processing on an input image and a post-processing unit operable to perform post-processing on an image after combination (col. 2 line 45 – col. 3 line 13).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do preprocess and post process of image in the apparatus of Kraft.

The suggestion/motivation for doing so would have been that image signal is manipulated to enhance or suppress echoes in particular image before process the image and after process the image for display.

Therefore, it would have been obvious to combine Hardin with Kraft to obtain the invention as specified in claim 28.

With respect to claim 64, please refer to rejection for claim 28 above.

10. Claims 29 and 65 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841) and in further view of Grenier et al. (US 5,079,698).

With respect to claim 29, Kraft and Hardin teach all the limitations of claim 28 and a correction data calculation unit operable to find a contrast improvement amount of the object pixel (para. [0014]); a conversion standard value calculation unit operable to find a conversion standard value for converting the contrast improvement amount to a value of pixel in the enhanced image (para. [0014]); and a pixel value conversion unit operable to convert the contrast improvement amount to a value of pixel in the enhanced image based on the conversion standard value (para. [0049]).

Kraft and Hardin does not teach expressly that a comparison pixel setting unit operable to set comparison pixels from among pixels in the area surrounding the object pixel to be used in the comparison.

Grenier et al. teaches a comparison pixel setting unit operable to set comparison pixels from among pixels in the area surrounding the object pixel to be used in the comparison (col. 11 lines 16 - 30).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to compare pixels in in the area surrounding the object pixel in the apparatus of Kraft and Hardin.

The suggestion/motivation for doing so would have been that to find subtle changes in contrast and remove the effect of variations in the light field from the selected area.

Therefore, it would have been obvious to combine Grenier et al. with Kraft and Hardin to obtain the invention as specified in claim 29.

With respect to claim 65, please refer to rejection for claim 29 above.

11. Claims 30-32 and 66-68 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841) and in further view of Grenier et al. (US 5,079,698) and in further view of McNeil et al. (US 5,790,714).

With respect to claim 30, Kraft, Hardin and Grenier et al. teach all the limitations of claim 29 as applied above from which claim 30 respectively depend.

Kraft and Matama does not teach expressly that a surrounding average unit operable to find a weighted average for density of the comparison pixels; and an improvement amount calculation unit operable to find a contrast improvement amount from the average density obtained by the surrounding average unit and density of the object pixel.

McNeil et al. teaches a surrounding average unit operable to find a weighted average for density of the comparison pixels; and an improvement amount calculation

unit operable to find a contrast improvement amount from the average density obtained by the surrounding average unit and density of the object pixel. (col. 2 line 65 – col. 3 line 4).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to do weighted average of input image and enhanced image in the apparatus of Kraft and Matama.

The suggestion/motivation for doing so would have been that the final image to contain a good representation of input image.

Therefore, it would have been obvious to combine McNeil et al. with Kraft to obtain the invention as specified in claim 30.

With respect to claim 31, Kraft teaches an edge data detection unit operable to detect edge data of the object pixel (para. [0049] and [0171]); and McNeil et al. teaches a surrounding average unit operable to find a weighted average for density of the comparison pixels; a correction coefficient calculation unit operable to calculate a correction coefficient for the edge data based on the edge data obtained by the edge data detection unit; a comparison amount correction unit operable to correct the average density obtained by the surrounding average unit using the correction coefficient; and an improvement amount calculation unit operable to find a contrast improvement amount from the corrected average density and the density of the object pixel (col. 2 line 65 – col. 3 line 4).

With respect to claim 32, McNeil et al. teaches a surrounding average unit operable to find a weighted average for density of the comparison pixels; an improvement amount calculation unit operable to find a contrast improvement amount from the average density obtained by the surrounding average unit and the density of the object pixel; an enhancement component calculation unit operable to calculate an enhancement component from difference in the density of the comparison pixel and the object pixel;and an improvement amount correction unit operable to add the enhancement component to the contrast improvement amount (col. 2 line 65 – col. 3 line 4).

With respect to claim 65, please refer to rejection for claim 30 above.

With respect to claim 66, please refer to rejection for claim 31 above.

With respect to claim 67, please refer to rejection for claim 32 above.

12. Claims 35 and 71 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841) in further view of Hentschel et al. (US 6,239,772).

Kraft and Hardin teach all the limitations of claim 28 as applied above from which claim 35 respectively depend.

Kraft and Hardin does not teach expressly that the pre-processing unit performs inverse conversion of gamma conversion on the input image in advance.

Hentschel et al. teaches the pre-processing unit performs inverse conversion of gamma conversion on the input image in advance (col. 2 line 62 – col. 3 line 20).

At the time of the invention it would have been obvious to perform inverse conversion of gamma conversion on the input image in advance in the apparatus of Kraft and Hardin.

The suggestion/motivation for doing so would have been that to avoid superfluous signal pre corrected gamma characteristic is necessary.

Therefore, it would have been obvious to combine Hentschel et al. with Kraft and Hardin to obtain the invention as specified in claim 35.

With respect to claim 71, please refer to rejection for claim 35 above.

13. Claims 36 and 72 are rejected under 35 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841) in further view of Hentschel et al. (US 6,239,772) and in further view of Hsu (US 6,239,772).

Kraft, Hardin and Hentschel et al. teach all the limitations of claim 35 as applied above from which claim 36 respectively depend.

Kraft, Hardin and Hentschel et al. does not teach expressly that the post-processing unit performs the gamma conversion.

Hsu et al. teaches the post-processing unit performs the gamma conversion (col. 3 lines 40-51).

At the time of the invention it would have been obvious to perform gamma conversion on the output image in the apparatus of Kraft, Hardin and Hentschel et al.

The suggestion/motivation for doing so would have been that to correct the bit enhanced signal and generate an image code for further image processing or displaying.

Therefore, it would have been obvious to combine Hsu with Kraft, Hardin and Hentschel et al. to obtain the invention as specified in claim 36.

With respect to claim 72, please refer to rejection for claim 36 above.

14. Claims 37 and 73 are rejected under 37 USC 103(a) as being unpatentable over Kraft (US 2002/0141640) in view of Hardin (US 5,585,841) in further view of Usami (US 5,696,840).

Kraft and Hardin teach all the limitations of claim 28 as applied above from which claim 37 respectively depend.

Kraft and Hardin does not teach expressly that an input brightness/color calculation unit operable to calculate a brightness value and color difference components of the input image; a brightness adjustment unit operable to compare a brightness component of the input image obtained by the input brightness/color

calculation unit with the brightness component of a combined image and adjust the brightness component of the combined image; a color component correction unit operable to correct the color difference components of the input image obtained by the input brightness/color calculation unit based on the brightness component of the combined image obtained by the brightness adjustment unit; an image regeneration unit operable to regenerate the combined image using the brightness component of the combined image obtained by the brightness adjustment unit and the corrected color difference components obtained by the color component correction unit; and a gamma conversion unit operable to perform gamma conversion on the combined image obtained by the image regeneration unit.

Usami teaches an input brightness/color calculation unit operable to calculate a brightness value and color difference components of the input image; a brightness adjustment unit operable to compare a brightness component of the input image obtained by the input brightness/color calculation unit with the brightness component of a combined image and adjust the brightness component of the combined image; a color component correction unit operable to correct the color difference components of the input image obtained by the input brightness/color calculation unit based on the brightness component of the combined image obtained by the brightness adjustment unit; an image regeneration unit operable to regenerate the combined image using the brightness component of the combined image obtained by the brightness adjustment unit and the corrected color difference components obtained by the color component

correction unit; and a gamma conversion unit operable to perform gamma conversion on the combined image obtained by the image regeneration unit (col. 5 lines 20-33).

At the time of the invention it would have been obvious to correct brightness and color and gamma correction in the apparatus of Kraft and Hardin.

The suggestion/motivation for doing so would have been that to output a natural image irrespective of the characteristics of an image.

Therefore, it would have been obvious to combine Usami with Kraft and Hardin to obtain the invention as specified in claim 37.

With respect to claim 73, please refer to rejection for claim 37 above.

Allowable Subject Matter

Claims 6, 11, 79, 80, 33, 34, 43, 48, 69 and 70 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randolph Chu whose telephone number is 571-270-

1145. The examiner can normally be reached on Monday to Thursday from 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RIC/

SAMIR AHMED
PRIMARY EXAMINER